

REMARKS

In the specification, the paragraphs beginning on page 5, line 18; page 5, line 24; page 19, line 6; and page 27, line 1 have been amended to correct minor editorial problems.

Claim 24 had been previously amended to address an Examiner's objection, correcting an editorial problem by deleting a duplicate "with the". Claims 25 and 39 are currently amended to correct editorial problems.

Claims 2-15, 20-26, 28-37, 39-41 remain in this application. Claims 1, 16-19, and 27 are canceled without prejudice. Claim 42 has been added.

In the current Office Action, the Examiner has not rejected or objected to pending claim 38. Applicants believe claim 38 to be allowable.

35 U.S.C. §103**Claims 1-3, 11, 27-28, and 31**

Claims 1-3, 11, 27-28 and 31 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,995,578 to Cullen et al (Cullen). Applicants respectfully traverse the rejection. Claims 1 and 27 are canceled without prejudice.

Currently amended independent claim 2 recites

A method comprising:

initiating a search for images based on at least one query keyword in a query;

identifying, during the search, first images having associated keywords that match the query keyword and second images that contain low-level features similar to those of the first images; and

ranking the first and second images.

Cullen describes a searching system that is performed on a document database using text search, and a grouping of documents (images) based on appearance of the documents. Documents of interest are first searched by a text string. Documents meeting the text string search are grouped in clusters based on similarity of features. The documents are not ranked in any particular order.

Cullen fails to teach or suggest "ranking the first and second images" as recited by claim 2.

The Examiner argues that Cullen teaches this element. Specifically, the Examiner states that "Cullen teaches ranking the first and second images ([Cullen], col. 6, lines 30-35)". Applicants disagree.

Cullen describes "[d]ocuments meeting the text based search are grouped together in grouping step 108 to form clusters based on similarity of the features extracted from each image." Cullen at col. 4, lines 22-25. Cullen then describes that the "search continues by applying the grouping step [108] to the selected cluster of documents subdividing this cluster into a new set of clusters 1008, each having a new representative document image." Cullen at col. 6, lines 30-34. What the Examiner refers to in Cullen is a clustering or grouping of images based on a similarity of features. However, Cullen does not teach or suggest "ranking" of images or documents.

In contrast to grouping of images as disclosed in Cullen, ranking of images is based on features that are more similar to a target or reference image as described on page 13 of the current application. A first image may be ranked higher than a second if it more closely matches the features of the target or

1 reference image. In grouping, the first and second images may be grouped
2 together if they have similarities that match a condition; however, since they are
3 not "ranked" it is undetermined as to how they compare to a target image, since
4 they are never compared or ranked against the target image.

5 Applicants respectfully request that the §103 rejection of claim 2 be
6 withdrawn.

7 **Dependent claims 3 and 11** depend from and comprise all the elements of
8 currently amended claim 2. As such, dependents claims 3 and 11 are allowable by
9 virtue of their dependency on base claim 2. Applicants respectfully request that
10 the §103 rejection of claims 3 and 11 be withdrawn.

11 **Currently amended independent Claim 28** recites

12 An image retrieval system comprising:

13 a query handler to handle both keyword-based queries having one or
14 more search keywords and content-based queries having one or more low-
15 level features of an image; and

16 a feature and semantic matcher to identify at least one of (1) first
17 images having keywords that match the search keywords from a keyword-
18 based query, and (2) second images having low-level features similar to the
low-level features of a content-based query, wherein the feature and
semantic matcher ranks the images.

19 Cullen does not teach or suggest the image retrieval system of claim 28. In
20 particular, Cullen fails to teach or suggest "the feature and semantic matcher ranks
21 the images".

22 The Examiner presents the same arguments in rejecting claim 28 as
23 presented in rejecting claim 2. Applicants reassert the arguments presented above
24 supporting claims 2, in support of claim 28. Applicants respectfully request that
25 the §103 rejection of claim 28 be withdrawn.

1 **Dependent claim 31** depends from and comprises all the elements of claim
2 28. As such, dependent claim 31 is allowable by virtue of its dependency on base
3 claim 28. Applicants respectfully request that the §103 rejection of claim 31 be
4 withdrawn.

5 **Claims 4-10, and 32-37**

6 Claims 4-10, and 32-37 are rejected under 35 U.S.C. §103(a) as being
7 unpatentable over Cullen in view of U.S. Patent 6,369,811 to Graham et al
8 (Graham). Applicants respectfully traverse the rejection.

9 **Currently amended independent claim 4** recites

10 A method comprising:

11 initiating a search for images based on at least one query keyword in
12 a query;

13 identifying, during the search, first images having associated
14 keywords that match the query keyword and second images that contain
15 low-level features similar to those of the first images;

16 presenting the first and second images to a user; and

17 monitoring feedback from the user as to which of the first and
18 second images are relevant to the query.

19 Cullen describes an initial search of documents (images) based on a text
20 string. If the text based search yields the document of interest, then the user
21 discontinues the search. A second search is based on a representative document
22 chosen from the group of documents from the initial search. Cullen describes that
23 in a preferred embodiment, features from the set of documents found during the
24 text search are stored in a database. Cullen does not disclose that the set of
25 documents (images) from the first search are ever presented to the user. Since the

1 first documents are not presented to the user, no monitoring of feedback as to the
2 first images may be performed along with second images from the second search.

3 Cullen fails to teach or suggest "presenting the first and second images to a
4 user and monitoring feedback from the user as to which of the first and second
5 images are relevant to the query." as recited by claim 4.

6 The Examiner argues that Cullen teaches this element. Specifically, the
7 Examiner states Cullen as teaching "presenting the first and second images to a
8 user" (col. 4, lines 14-27). However, Cullen actually teaches that a "representative
9 document image is selected in step 110 for each cluster of document images
10 formed in the grouping step 108". Cullen col. 4, lines 25-27. A single document
11 is chosen from the first search to be the basis of the second feature search;
12 however, the other images from the first search are not used for the second feature
13 search. A single document is used for second feature search. Furthermore, the
14 documents from the first search are not disclosed as presented to the user, along
15 with images from the second feature based search.

16 In addition, Cullen discloses that only features of documents, and not the
17 documents from the first text based search, are kept in a database. Cullen col. 4,
18 lines 20-22. Features of documents are not the same as the documents images
19 from which they are extracted from. The features are a limited subset of the
20 documents. Cullen further fails to teach or suggest that such features are ever
21 presented along with images from the feature based search.

22 Graham is cited for teaching "monitoring the feedback from the user or the
23 system". Graham, however; provides no assistance as to the recited methodology
24 of claim 4, in light of the Cullen's lack of teaching or suggestion that the first
25 images are presented along with the second images. If the first images are never

1 presented, a user's feedback is never monitored as to such first images. Applicants
2 respectfully request that the §103 rejection of claim 4 be withdrawn.

3 **Currently amended independent claim 5** recites similar language as to
4 claim 4 and benefits from the same arguments as claim 4. Applicants respectfully
5 request that the §103 rejection of claim 4 be withdrawn.

6 **Dependent claims 6-10** depend from and comprise all the elements of
7 currently amended claim 2.

8 Applicants reassert the arguments presented above supporting claim 2, in
9 support of claims 6-10.

10 Claims 6-10 further include elements of "presenting the first and second
11 and images to a user" and "receiving feedback from the user". The combination of
12 Cullen and Graham fails to teach or suggest these elements. Applicants reassert
13 the arguments above supporting claim 4, in support of claims 6-10. Applicants
14 respectfully request that the §103 rejection of claims 6-10 be withdrawn.

15 **Currently amended independent claim 32** recites

16 An image retrieval system comprising:

17 a query handler to handle both keyword-based queries having one or
18 more search keywords and content-based queries having one or more low-
19 level features of an image;

20 a feature and semantic matcher to identify at least one of (1) first
21 images having keywords that match the search keywords from a keyword-
22 based query, and (2) second images having low-level features similar to the
low-level features of a content-based query, wherein the feature and
semantic matcher ranks the images;

23 a user interface to present the images identified by the feature and
24 semantic matcher to a user, the user interface allowing the user to indicate
25 whether the images are relevant to the query; and

1 a feedback analyzer to train the image retrieval system based on user
2 feedback as to relevancy.

3 The combination of Cullen and Graham fails to teach or suggest the method
4 of claim 32. Claim 32 includes all the elements of claim 28, and benefits from the
5 arguments presented in support of claim 28; in particular the arguments presented
6 as the recited element of a "feature and semantic matcher that ranks the images".

7 Claim 32 further includes the elements of "a user interface to present the
8 images identified by the feature and semantic matcher to a user, the user interface
9 allowing the user to indicate whether the images are relevant to the query; and a
10 feedback analyzer to train the image retrieval system based on user feedback as to
11 relevancy".

12 As discussed above in support of claim 4, the combination of Cullen and
13 Graham fails to teach or suggest presenting "images identified by the feature and
14 semantic matcher", "allowing the user to indicate whether images are relevant",
15 and "feedback" from the user. Applicants reassert the arguments above supporting
16 claim 4, in support of claim 32. Applicants respectfully request that the §103
17 rejection of claims 32.

18 **Dependent claims 33-37** depend from and comprise all the elements of
19 currently amended claim 28.

20 Applicants reassert the arguments presented above supporting claim 28, in
21 support of claims 33-37.

22 Claims 33-37 further include elements of presenting "images identified by
23 the feature and semantic matcher", "allowing the user to indicate whether images
24 are relevant", and "feedback" from the user. Applicants reassert the arguments
25

1 above supporting claim 4, in support of claim 33-37. Applicants respectfully
2 request that the §103 rejection of claims 33-37 be withdrawn.

3 **Claims 12-15, and 39-41**

4 Claims 12-15, and 39-41 are rejected under 35 U.S.C. §103(a) as being
5 unpatentable over U.S. Patent 5,579,471 to Barber et al (Barber). The Examiner
6 makes mention of a Lang reference; however, does not particular mention it as a
7 patent or as part of a §103 rejection with Barber. Emmanuel Rivera contacted the
8 Examiner and it was clarified that the Examiner refers to U.S. Patent 6,314,420 to
9 Lang et al (Lang). Applicants respectfully traverse the rejection.

10 **Independent claim 12 recites**

11 A method comprising:

12 permitting entry of both keyword-based queries and content-based
13 queries;

14 finding images using both semantic-based image retrieval and low-
15 level feature-based image retrieval;

16 presenting the images to a user so that the user can indicate whether
17 the images are relevant; and

18 conducting semantic-based relevance feedback and low-level
19 feature-based relevance feedback in an integrated fashion.

20 Barber describes a visual characteristic search of images in a database.
21 Images may be selected based on several characteristics including color, pixel
22 information, and text annotation. The images from the search are simply presented
23 to a user without any feedback from the user as to relevance. This precludes the
24 ability to perform semantic-based and feature-based feedback.
25

1 The combination of Barber and Lang fails to teach or suggest the method of
2 claim 12. Barber does not suggest or teach "presenting the images to a user so that
3 the user can indicate whether the images are relevant."

4 The Examiner specifically states that "Barber teaches ...presenting the
5 images to a user so that the user can indicate whether the images are relevant (col.
6 5, lines 30-42).

7 Barber shows an image query performed by a "query-by-image-content
8 (QBIC) engine 32 which receives the RUN QUERY". Barber at col. 5, lines 31-
9 32. "The results of the search are used by the QBIC engine 32 to construct a result
10 list of images satisfying the query parameters ... and the images in the result list
11 are provided to the window control 22 for display in a results window, which is not
12 shown." Barber at col. 5, lines 34-42. Although Barber describes how the results
13 are presented to the user, Barber does not disclose that the user may indicate
14 whether the results are relevant. The method described in Barber would not have a
15 need to allow the user to indicate which results are relevant, since as the Examiner
16 admits "Barber does not explicitly teach conducting semantic-based relevance
17 feedback and low-level feature-based feedback". Without a need to provide
18 feedback, there is no need to provide a user the ability to indicate if the results are
19 relevant.

20 Lang is cited for teaching "the user give the feedback on the search results".
21 Lang, however, provides no assistance in light of Barber as to the recited methods
22 of claim 12. Since Barber does not provide the ability to indicate if the results are
23 relevant, it would not have been obvious to combine Barber with the "user
24 feedback" of Lang to provide either semantic-based relevance or feature-based
25 feedback.

1 Accordingly, a combination of Barber and Lang fails to teach or suggest the
2 claimed methods. Applicants respectfully request that the §103 rejection of claim
3 12 be withdrawn.

4 **Dependent claims 13-15** depend from and comprise all the elements of
5 currently amended claim 12. As such, dependent claims 13-15 are allowable by
6 virtue of their dependency on base claim 12. Applicants respectfully request that
7 the §103 rejection of claims 13-15 be withdrawn.

8 **Independent claim 39** recites

9 A computer-readable medium having computer-executable
10 instructions that, when executed, direct a computer to:

11 find images using both semantic-based image retrieval and low-level
12 feature-based image retrieval;

13 present the images to a user so that the user can indicate whether the
14 images are relevant; and

15 concurrently conduct semantic-based relevance feedback and low-
16 level feature-based relevance feedback.

17 The combination of Barber and Lang fails to teach or suggest the computer-
18 readable medium of claim 39. Barber does not suggest or teach "present[ing] the
19 images to a user so that the user can indicate whether the images are relevant."
20 Lang does not suggest or teach "concurrently conduct[ing] semantic-based
21 relevance feedback and low-level feature-based relevance feedback".

22 The Examiner presents the same arguments in rejecting claim 39 as
23 presented in rejecting claim 12. Applicants reassert the arguments presented above
24 supporting claims 12, in support of claim 39. Applicants respectfully request that
25 the §103 rejection of claim 39 be withdrawn.

1 **Dependent claims 40 and 41** depend from and comprise all the elements of
2 base claim 39. As such, dependent claims 40 and 41 are allowable by virtue of
3 their dependency on base claim 39. Applicants respectfully request that the §103
4 rejection of claims 40 and 41 be withdrawn.

5 **Claims 16-19, and 38**

6 Claims 16-19, and 38 are rejected under 35 U.S.C. §103(a) as being
7 unpatentable over U.S. Patent 5,899,999 to De Bonet (De Bonet). Claims 16-19,
8 and 38 are canceled.

9 **Claims 20, and 22-23**

10 Claims 20, and 22-23 are rejected under 35 U.S.C. §103(a) as being
11 unpatentable over U.S. Patent 6,092,080 to Gustman (Gustman). Applicants
12 respectfully traverse the rejection.

13 **Independent claim 20 recites:**

14 A method comprising:

15 presenting a result set of images that are returned from an image
16 retrieval search of a query having at least one keyword;

17 monitoring feedback from a user as to whether the images in the
18 result set are relevant to the query;

19 in an event that the user selects at least one image as being relevant
20 to the query, associating the keyword in the query with the selected image
21 to form a first keyword-image association and assigning a comparatively
large weight to the first keyword-image association; and

22 in an event that the user identifies an example image for refinement
23 of the search, associating the keyword in the query with the example image
24 to form a second keyword-image association and assigning a comparatively
25 small weight to the second keyword-image association.

1 Gustman describes a system for cataloguing, storing, retrieving, and
2 distributing multimedia data. Gustman describes use of a quality assurance
3 mechanism that marks input data, not output data, with quality assurance events.
4 Specifically, a user marks the input data with the quality assurance events.
5 Therefore, prior to any searching, the user has marked the input data with quality
6 assurance events. The quality assurance events distinguish input data from one
7 another, and searching may be performed on particular quality assurance events.

8 Gustman fails to teach or suggest the method of claim 20. The Examiner
9 admits that

10 Gustman does not explicitly teach monitoring feedback from a user
11 as to whether the images in the result set are relevant to the query,
12 in an event that the user selects at least one image as being relevant
13 to the query, associating the keyword associating the keyword in
14 the query with the selected image to form a first keyword-image
15 association and assigning a comparatively large weight to the first
16 keyword-image association; and in an event that the user identifies
17 an example image for refinement of the search, associating the
18 keyword in the query with the example image to form a second
19 keyword-image association and assigning a comparatively small
20 weight to the second keyword-image association.

21 The Examiner cites Gustman as teaching "a quality assurance mechanism
22 can be used to monitor the quality of the input data and provide feedback".
23 Gustman, however, fails to teach or suggest "presenting a result set of images that
24 are returned from an image retrieval search"; then "monitoring feedback from a
25 user as to whether the images in the result set are relevant to the query"; and then
26 "a first keyword-image association" and "a second keyword-image association" as
27 recited by elements of claim 20.

28 Gustman discloses a quality assurance mechanism that marks input data, but
29 fails to teach or suggest that the quality assurance mechanism may be used to mark

1 or associate the results from the query. Gustman particularly describes quality
2 assurance events that are added to input data by a user, where the input data is to
3 be searched later. Gustman at col. 17, lines 21-25. There is no teaching or
4 suggestion in Gustman that output results (searched images) may be marked as
5 feedback from the user as relevant to the query. Accordingly, Gustman fails to
6 teach or suggest the claimed methods. Applicants respectfully request that the
7 §103 rejection of claim 20 be withdrawn.

8 **Dependent claims 22-23** are allowable by virtue of their dependency on
9 base claim 20. Applicants respectfully request that the §103 rejection of claims
10 21-23 be withdrawn.

11 **Claim 21**

12 Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over
13 Gustman in view of Barber. Applicants respectfully traverse the rejection.

14 **Dependent claim 21** depends from and comprises all the elements of claim
15 20. Applicants reassert the arguments presented above supporting claim 20, in
16 support of claim 21.

17 As such, dependent claim 21 is allowable by virtue of its dependency on
18 base claim 20. Applicants respectfully request that the §103 rejection of claims 21
19 be withdrawn.

20 **Claims 24-25**

21 Claims 24-25 are rejected under 35 U.S.C. §103(a) as being unpatentable
22 over U.S. Patent 6,442,438 to Nojima (Nojima) in view of U.S. Patent 6,504,571
23 to Narayanaswami (Narayanaswami). Applicants respectfully traverse the
24 rejection.
25

1 **Independent claim 24 recites**

2 A method comprising:

3 computing, for each category, a representative feature vectors of a
4 set of existing images within the category;

5 determining a set of representative keywords that are associated with
6 the existing images in each category;

7 comparing, for each new image, the low-level feature vectors of the
8 new image to the representative feature vectors of the existing images in
each category to identify a closest matching category; and

9 labeling the new image with the set of representative keywords
10 associated with the closest matching category.

11 Nojima describes a video information retrieval system that allows video
12 data to be inputted and retrieved. For each video data that is stored (and may be
13 retrieved), annotation information such as image feature vectors are used to
14 identify the particular video data. The categories of the video data are not
15 provided a representative feature vector.

16 The combination of Nojima and Narayanaswami fails to teach or suggest
17 the method of claim 24.

18 The Examiner specifically cites Nojima as teaching "computing, for each
19 category, a representative feature vectors of a set of existing images within the
20 category." Nojima, however; fails to teach or suggest that feature vectors may be
21 computed for each category. Although Nojima describes the use of feature vector,
22 such feature vectors are related to individual and particular video data. Nojima
23 describes the use of a feature vector calculation processing module 72 that
24 calculates an image feature vector for each extracted still image. Nojima at col. 5,
25 lines 10-12. Nojima does not teach or suggest that feature calculation processing

1 module 72 may be used for a category of images. Although Nojima is cited for
2 teaching "comparing, for each new image, the low-level feature vectors of the new
3 image to the representative feature vectors of the existing images in each category
4 to identify a closest matching category", the Examiner has not shown where in
5 Nojima it is disclosed that representative feature vectors are used to identify a
6 closest matching category, since Nojima is directed to applying feature vectors to
7 individual objects and not categories.

8 Narayanaswami is cited for teaching "the annotation module annotates the
9 keywords to the images" Narayanaswami, however, provides no assistance as to
10 the recited methodology of claim 24. Applicants respectfully request that the §103
11 rejection of claim 24 be withdrawn.

12 **Dependent claim 25** depends from and comprise all the elements of claim
13 24. As such, dependent claim 25 is allowable by virtue of its dependency on base
14 claim 24. Applicants respectfully request that the §103 rejection of claim 25 be
15 withdrawn.

16 **Claim 26**

17 Claim 26 is rejected under 35 U.S.C. §103(a) as being unpatentable over
18 Nojima in view of Narayanaswami and in further view of U.S. Patent 5,594,809 to
19 Kopec et al (Kopec). Applicants respectfully traverse the rejection.

20 **Dependent claim 26** depends from and comprises all the elements of claim
21 24. Applicants reassert the arguments presented above supporting claim 24, in
22 support of claim 26.

23 As such, dependent claim 26 is allowable by virtue of its dependency on
24 base claim 24. Applicants respectfully request that the §103 rejection of claim 26
25 be withdrawn.

1 **Claims 29-30**

2 Claims 29-30 are rejected under 35 U.S.C. §103(a) as being unpatentable
3 over Nojima in view of Narayanaswami and in further view of U.S. Patent
4 6,504,571 to Stuckey et al (Stuckey). Applicants respectfully traverse the
5 rejection.

6 Dependent claims 29-30 depend from and comprise all the elements of
7 amended claim 28. Applicants reassert the arguments presented above supporting
8 claim 28, in support of claims 29-30.

9 The Examiner has not shown where in Nojima or Narayanaswami it is
10 disclosed "a feature and semantic matcher to identify at least one of (1) first
11 images having keywords that match the search keywords from a keyword-based
12 query, and (2) second images having low-level features similar to the low-level
13 features of a content-based query, wherein the feature and semantic matcher ranks
14 the images" as recited in base claim 28. Stuckey provides no assistance as to the
15 image retrieval system of claims 29-30.

16 According a combination of Nojima, Narayanaswami, and Stuckey fails to
17 teach or suggest the image retrieval system of claims 29-30. Applicants
18 respectfully request that the §103 rejection of claims 29-30 be withdrawn.
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CONCLUSION

All pending claims 2-15, 20-26, 28-37, 39-41 are in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the subject application. If any issues remain that prevent issuance of this application, the Examiner is urged to contact the undersigned attorney before issuing a subsequent Action.

Respectfully Submitted,

Dated: 10/3/03

By: 

Emmanuel A. Rivera
Reg. No. 45,760
(509) 324-9256 ext. 245

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